

## Water table fluctuation and carbon dioxide emission from a tropical peat soil cultivated with pineapples (*Ananas comosus* L. Merr.)

### ABSTRACT

Tropical peat land is an important buffer for climate change as it absorbs atmospheric carbon and stores large carbon reserve. Inappropriate drainage and agricultural development on peat land results in GHG emissions such as CO<sub>2</sub> and CH<sub>4</sub> which could shift the peat land ecosystem from carbon sink to carbon source. The objectives of this study were to: (i) quantify CO<sub>2</sub> loss in a tropical soil under simulated water table fluctuation and (ii) determine the relationship between depth of water table and CO<sub>2</sub> loss of a tropical soil cultivated with pineapples. Soil CO<sub>2</sub> emission was captured using closed chamber method in field lysimeter and quantified using gas chromatography. It was carried out in July (dry month) and December 2015 (wet month). The peat soil water table fluctuation did not significantly affect emission of CO<sub>2</sub> in pineapple cultivation. For lower water table, 147.5 t CO<sub>2</sub> ha<sup>-1</sup> yr<sup>-1</sup> was emitted in the dry month whereas for higher water table, 19.6 t CO<sub>2</sub> ha<sup>-1</sup> yr<sup>-1</sup>. In the wet month, CO<sub>2</sub> emission of the lower water table was 23.7 t CO<sub>2</sub> ha<sup>-1</sup> yr<sup>-1</sup> whereas for high water tables the emission was 25.6 t CO<sub>2</sub> ha<sup>-1</sup> yr<sup>-1</sup>. Soil CO<sub>2</sub> emission for the lower water table was higher than that of the high water table whereas the opposite was true for the higher water table because of increase in soil temperature in the dry month. Regardless of season and depth of peat soil water table, this study will provide significant understanding of the effect of water table management on carbon loss in peat soils under pineapple cultivation.

**Keyword:** Peat soil; Pineapple cultivation; Water table fluctuation; Lysimeter